

Space Weather Forecast

Issued on Saturday, 09 December 2023 at 01:11 Local

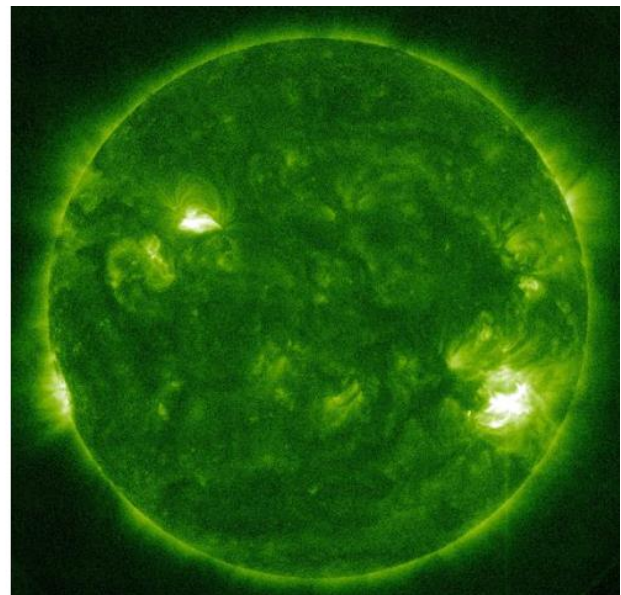
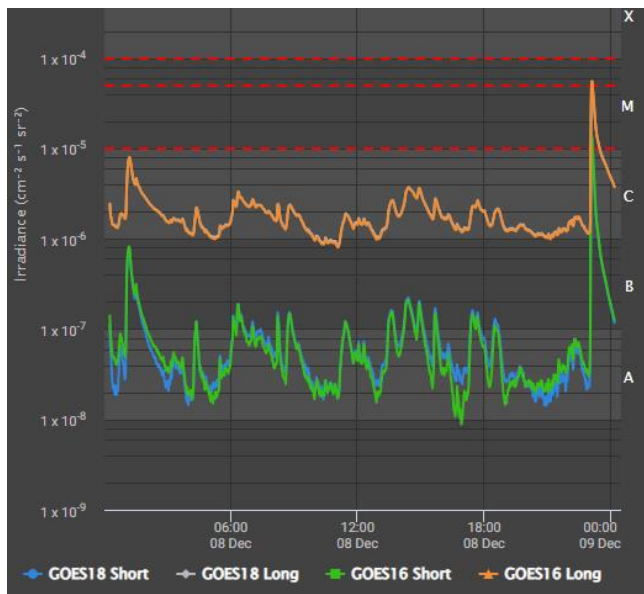
This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of R1-R2 Radio Blackouts throughout. Chance of S1 given recent X-ray flare.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to Moderate in the past 24 hours, with occasional Common-class flares observed for the most part, markedly broken by a middling Moderate-class flare from a growing sunspot group in the southwest at 08/2307UTC.

Figure 4: X-ray flux trace as well as false-colour extreme UV imagery of the Moderate-class X-ray flare from a growing sunspot region on the southwest of the Sun at 08/2307UTC.



There are now eight sunspot groups on the Earth-facing side of the Sun, with two arriving on the eastern solar horizon. At present, these appear magnetically unipolar, although the southernmost may shortly reveal a trailing spot and bipolarity. The main changes in the past day have been proliferation in the leading portion of a complex region in the southwest, which was perhaps tied to its eventual large X-ray flare. Also of note were minor proliferation in the trailing portions of two groups in the northeast.

There were a number of 'prominence' and 'filament eruptions' in the past 24 hours (arcs of plasma leaving the Sun), with these mainly from the southwestern solar horizon during the UTC early hours, followed by a large filament slowly lifting off from the northwest around 08/0300UTC. Perhaps most notably, a filament from near the middle of the facing side was then seen to erupt around 08/0500UTC on near-infrared ground-based observatory imagery. The earlier prominence

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

and filament activity was determined not to be Earth-directed, while the final more significantly-placed event could not be located on satellite imagery and may instead have been re-absorbed (to no effect).

Later in the period, a large Coronal Mass Ejection (CME) into the UTC evening was likely associated with far-sided activity, with no obvious source region on the Earth-facing side, with a final prominence lift off occurring on the northwestern horizon around 08/2100UTC. No obvious ejecta was visible associated with the Moderate-class flare, however this is now a main source of monitoring along with any solar radiation storm response.

Despite this activity, no new Earth-directed CMEs were in evidence.

Solar Wind / Geomagnetic Activity: Solar winds have continued to be reflective of a gradual exit from a fast solar wind regime. The solar wind speed showed a decline through slightly elevated levels in the 24 hours, with the number of particles in the wind near the long-term average. The associated magnetic field showed a roughly level tendency near background, while the north-south component showed no strong tendency either co or anti-aligned with the Earth's field.

The net result of the above solar wind measures was provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a chance of increasing to moderate, with potential sources most likely to be sunspot regions on either the southwest or northeast of the Sun. Chances drop slightly on day four (Tuesday 12 December), with the expected departure of several western solar hemisphere regions and a relative lack of oncoming eastern replacements.

Solar Wind / Geomagnetic Activity: There is one marginal CME in the forecast, with a glancing blow from the 07 December northeastern quadrant filament perhaps coinciding with an arriving fast solar wind late on Sunday 10 December. Elevated speeds may be reached, with the combined effect perhaps resulting in a peak slight chance of a G1/Minor Geomagnetic Storm interval, perhaps with a tail into Monday 11 December that may further be extended by any fast wind from yet another minor coronal hole fast wind.

Energetic Particles / Solar Radiation: The 08/2307UTC Moderate-class flare's location near the better-connecting western solar horizon may result in a Chance of S1 Minor Solar Radiation Storm in the coming few hours, and the probabilities have been adjusted upwards to reflect this risk. From here, they should relax to a daily Slight Chance into the new UTC working week, albeit higher than previously advertised given a resurgent sunspot group in a prone position.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	1	20	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	50	50	50	40
Very Active	R3 to R5 X	No	10	10	10	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	30	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)